MEMORANDUM

To: Bob Morgan
Jerry Olds
Kent Jones
Jim Riley
Mike Quealy
Norm Johnson
Boyd Clayton
Bill Schlotthauer

From: Jared Manning
Chuck Williamson

Date: January 25, 2001

Re: Salt Lake Valley Ground-Water Management Plan

Attached is the latest draft of the proposed Salt Lake Valley Ground-Water Management Plan. On May 17, 2000 the Division of Water Rights presented a previous version of this plan during a public meeting with Salt Lake Valley water users. The objective of that meeting was to solicit comments and suggestions from water users before proposing a final draft of the plan. Although only a small number of responses were received, several meaningful comments were submitted. The attached draft integrates several changes based upon these comments as well as those proposed by staff. It is presented here for your review and commentary. A staff meeting, scheduled for February 7, 2001, will highlight changes made to the plan and allow time to discuss certain aspects and pertinent issues related to the plan. Below is a listing of the significant changes made to the plan since the last draft.

1. **Elimination of the ten-feet-in-five-years water level decline criterion for determining excessive localized withdrawals.** It was determined that this specific criterion is not applicable to all areas of the valley. That is, in some areas of the valley a drop in ground-water levels of ten feet in five years may be indicative of excessive withdrawals, but in other areas, may only indicate natural water level fluctuation. Subsequently, we have replaced the ten-feet-in-five-years rule with a list of factors to be considered in determining where excessive withdrawals are occurring. This change was made as a result of comments from staff.
2. **Addition of restrictions for ground-water withdrawals in the southwestern portion of the valley**. This section (2.2.4) was added to the plan to aid the ground-water remediation efforts planned by Kennecott Utah Copper Corporation (KUCC). This section was added at the request of Kennecott.

3. **Addition of allowance for change applications that propose to transfer water rights from a restricted management square to another restricted management square with a lesser potential withdrawal.** Provided that certain criteria are met (see section 2.3.5), allowing these point of diversion changes may help to better distribute withdrawals throughout the valley. This was added at the request of several water users.
4. **Addition of allowance for change applications that propose to transfer water rights a limited distance**. This guideline (section 2.3.6) was added to allow water users a sufficient distance to find replacement well locations. This was added at the request of water users.
5. **Elimination of requirement for total volume certification in proofs of appropriation and proofs of change**. Many water users have expressed strong dissatisfaction with this requirement. There has also been discussion that this requirement has not brought about the desired effect of reducing the amount of paper water on file.
6. **Elimination of critical review of segregation applications**. It was determined that this section does little to accomplish the overall objectives of the plan.
7. **Elimination of water quality reporting requirement for water users that have a potential withdrawal of 250 acre-feet or more.** It was determined that enough water quality information is currently collected through other government agencies to thoroughly monitor water quality changes in Salt Lake Valley.
8. **Changes in Central Region boundaries.** The Central Region boundary was extended south to the Jordan Narrows along a narrow corridor enveloping the Jordan River. This change would better represent the discharge area of the valley.

Aside from the above changes, one issue pertinent to implementation of the management plan remains unresolved. Although the plan calls for distributing withdrawals according to the priority dates of individual water rights in areas where withdrawal limits have been exceeded or excessive withdrawals are occurring, there exists no definitive, generalized method for actually distributing the water. Several methods have been proposed, however each becomes extremely complex when attempting to take into account all variables such as determining the area in which the restrictions will be imposed and the amount of time users will be restricted from pumping. The approach that we have taken in this draft of the plan is to suggest a list of general considerations for remedying the problem. Thus area-specific information such as local geohydrology and recent precipitation patterns would be taken into account. In this way, the methodology for limiting withdrawals will be based on the specifics of the site, not just arbitrarily designated. Obviously this problem is applicable to other areas within the state where ground-water management plans have been implemented and will undoubtedly require further attention. Any suggestions that may help resolve the problem are welcome.

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Figures

1.0 Introduction

1.1 Background Information

The purpose of this management plan is to protect the groundwater resources of Salt Lake Valley, while allowing for maximum utilization of the water. The groundwater aquifer in Salt Lake Valley currently supplies approximately 130,000 acre-feet of water annually to the valley. The boundary of the unconsolidated basin fill material, which makes up the Salt Lake Valley aquifer system, is also used as the areal extent of this management plan, as illustrated in Figure 1.

The State Engineer implemented an Interim Groundwater Management Plan (Interim Plan) in Salt Lake Valley in April of 1991. The purpose of the Interim Plan was to address the over-appropriation of groundwater rights in Salt Lake Valley and to protect the quality of the resource while the United States Geological Survey (USGS) in cooperation with the public water suppliers and the Division of Water Rights conducted studies to determine the effects of large groundwater withdrawals on the water quality. These studies have been completed and are listed below:

- *Chemical composition of ground water, hydrologic properties of basin-fill material, and groundwater movement in Salt Lake Valley, Utah* (Department of Natural Resources Technical Publication No. 110-A)
- *Numerical simulation of groundwater flow in basin-fill material in Salt Lake Valley, Utah* (Department of Natural Resources Technical Publication No. 110-B)
- *Particle-tracking analysis of time-related capture zones for selected public-supply wells in Salt Lake Valley, Utah* (Department of Natural Resources Technical Publication No. 110-C)
- *Numerical simulation of the movement of sulfate in groundwater in southwestern Salt Lake Valley, Utah* (Department of Natural Resources Technical Publication No. 110-D)

A digital groundwater model for the Salt Lake Valley was developed in conjunction with the above technical publications. This model was created to simulate the various groundwater flow-related components -- rivers, canals and well withdrawals, for example -- of the aquifer system using the aquifer's physical properties like hydraulic conductivity and storage coefficients. The impact of various withdrawal patterns on the long-term integrity of the aquifer can be reasonably determined by using the model. The model also provides a way to track the paths of water particles as they travel through the aquifer from areas of recharge to their points of discharge. It also has the ability to calculate well capture zones for various time periods.

The Interim Plan was intended to guide water management during the period of time the USGS studies were being conducted. In adopting a long-term water management plan for the Valley, several provisions were added and some provisions of the Interim Plan modified to reflect the information obtained from the studies. The following Management Plan is proposed to guide

the long-term groundwater management activities in Salt Lake Valley. This plan may be modified if additional data becomes available and following review by the water users and other interested parties.

1.2 Modification of the Interim Groundwater Management Plan

The management areas used in the Interim Plan have been deleted and replaced with a different configuration designed to better deal with potential problems in the aquifer system. The management areas of the interim plan were based, generally, on water quality data collected from 1979-1984 (DNR Technical Publication No. 89). Also, the model has shown that the management areas would not be effective in preventing adverse effects on the aquifer caused by dense, localized withdrawal rates. In addition, the allowable amounts of groundwater withdrawals set forth in the interim plan have been modified for various areas.

1.3 Groundwater Management Plan Objective

The objective of this groundwater management plan is to allow for maximum utilization of the groundwater resource within the constraint that water quality is not unreasonably affected. In proposing this groundwater management plan, the State Engineer has taken into account his statutory authority and has worked within these limits.

2.0 Salt Lake Valley Groundwater Management Plan

To better manage the groundwater resource of Salt Lake Valley and to protect existing water rights the following policy guidelines are hereby proposed:

2.1 Groundwater Withdrawal Limits

In order to fulfill the objectives of this management plan, guidelines are needed for regional and localized withdrawal limits. If regional or local withdrawals exceed the allowable respective withdrawal limits set forth in this Plan, the State Engineer will distribute the water in accordance with the priority dates using the following guidelines.

2.1.1 Regional Withdrawals from the Principal Aquifer

Everything in the valley located to the east of the Jordan River shall be referred to as the eastern region. Based on a five year moving average the maximum allowable groundwater withdrawal from the the eastern region shall be 95,000 af/yr. The maximum withdrawals permitted in the eastern region in any *one* year shall be 120,000 acre-feet.

Everything in the valley located to the west of the Jordan River shall be referred to as the western region. Based on a five year moving average the maximum allowable groundwater withdrawal from the western region shall be 70,000 af/yr. The maximum withdrawals permitted in the eastern region in any *one* year shall be 90,000 acre-feet.

2.1.2 Sub-Regional Groundwater Withdrawals from the Principal Aquifer

There is a relatively large area of dense groundwater withdrawals in the eastern region. The majority of the groundwater withdrawals in the eastern region are taken from this area. For management purposes, this subregion shall consist of Township 1 South, Township 2 South, and sections one through eighteen of Township 3 South, east of the Jordan River as shown on Figure 1. The maximum allowable withdrawal from this subregion shall be 85,000 af/yr based on a five year moving average.

2.1.3 Localized Groundwater Withdrawals from the Principal Aquifer in the Eastern Region

A management grid has been set up based on the U.S. Public Land Survey's system. Under this system, the land is divided into section, township, and range. Each section is a square measuring one mile on each side. In this management plan, one management square consists of any four sections, in a two section by two section configuration.

The maximum groundwater withdrawal rate in the eastern region for any square (a group of four sections) shall be 12,000 af/yr. Using this method, the squares overlap each other such that each section is part of four different management squares. Figure 2, below, illustrates how section 11 is part of four different management squares. Each of the four overlapping

squares has a withdrawal limit of 12,000 af/yr.

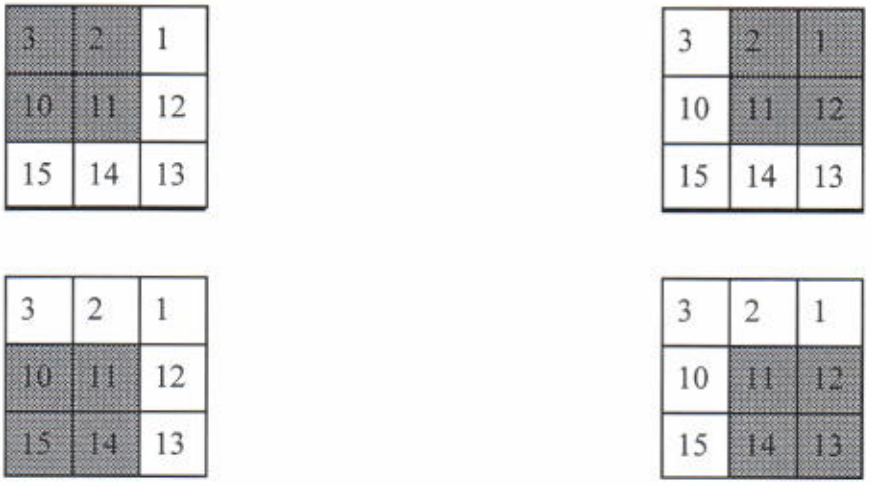

FIGURE 2 - Method Used to Distribute Groundwater Withdrawals

2.1.4 Groundwater Withdrawals From the Shallow aquifer

Additional withdrawals above the allowable withdrawal limits set forth in this section will be allowed if such withdrawals are from the shallow aquifer, provided that such withdrawals do not have an adverse affect on other water rights.

2.1.5 Groundwater Withdrawals from Restricted Areas

There are two (2) restricted pumping areas currently in the plan, and are illustrated in Figure 1. These areas are associated with the following contaminated sites:

- Vitro Tailings Site
- Sharon Steel Site

In order to protect the quality of the water by preventing changes in the vertical hydraulic gradient at these contaminated sites, the transfer of water rights into these areas will not be allowed. The restricted areas will be monitored to insure that current pumping in the area does not create a downward hydraulic gradient. These restricted areas are intended to be guidelines so that degradation of the principal aquifer system from contamination of the shallow aquifer does not occur. The restricted areas are based on available data and may change as new data is obtained. New restricted areas may be added to the plan upon evaluation of new data by the State Engineer and public review.

2.2 Applications to Change the Point of Diversion, Place of Use, or Purpose of Use

Change applications will be evaluated based upon their own merits. The evaluation may consider, but will not necessarily be limited to, potential impact on the following: existing water rights, the aquifer system as a whole, and overall water quality. The following guidelines will be used:

1) Change applications which propose to transfer water rights historically supplied from the shallow aquifer to the principal aquifer will not be approved.
2) Change applications which propose to transfer water rights from the west side of the Jordan River to the east side of the Jordan River will not be approved.
3) Change applications in the eastern region which propose to transfer water rights into a management square such that the potential withdrawals under the existing water rights would exceed the 12,000 af/yr limit will not be approved.
4) Change applications which propose to transfer water rights into the subregion described in section 2.1.2 from another part of the valley will not be approved.
5) Change applications in the western region which propose to transfer water rights into a management square such that the potential withdrawals under the existing water rights would exceed 2,000 af/yr will not be approved.

2.3 Proof of Appropriation/Change

In conjunction with all proof of appropriation or proof of change, the State Engineer shall require that the total volume of water to be certified has in fact been developed and placed to beneficial use. The State Engineer will review the total operation of a system or water user to ensure the intent of this requirement is met.

2.4 Well Spacing and Flow Rate

Well spacing and maximum flow rates of wells drilled after the adoption of this management plan shall be determined and shall be regulated so a well, when pumped at its maximum flow rate, will not cause more than 12 feet of drawdown on any well with an earlier priority date. Users in a particular area may enter into an agreement to provide a variance from this requirement if it does not interfere with third party rights and also subject to approval by the State Engineer.

2.5 Applications to Appropriate Water and Segregation Applications

Applications to appropriate water from the principal aquifer will be considered for single family uses in non-subdivision areas where water is not available from a public water supply system. Applications to appropriate water will be limited to a maximum annual diversion of 1.0 acre-foot. The uses under such application shall not exceed the domestic purposes of one family, the irrigation of 0.10 acres, and/or the stock watering of a maximum of 10 head of livestock. Such rights shall be approved as fixed time applications for a ten-year period and upon the condition that when a public water system is available, the users will connect to the

system, the well will be sealed, and the water right abandoned. Upon expiration of the ten-year period, if a public water supply system is still not available, such application will be extended upon proper filing of a request for extension.

All future segregation applications will be critically reviewed on their individual merits, according to current statutory provisions.

2.6 Extensions of Time for Applications to Appropriate Water

The State Engineer will critically review all future extension requests on approved applications to appropriate water pursuant to Section 73-3-12 of the Utah Code. In reviewing extension requests, if the State Engineer finds unjustified delays or a lack of due diligence, he may grant the request in part (including a reduction in the quantity of water available under the application), reduce the priority date, or deny the extension of time request.

2.7 Metering and Annual Reporting of Groundwater Withdrawals

All groundwater wells that have the right to potentially withdraw 50 acre-feet or more annually shall be equipped with a meter capable of measuring the instantaneous flow rate and total volume pumped through the meter. All water users meeting the above criteria shall be required to submit an annual report to the State Engineer by March 1 of each year setting forth the quantity of water diverted for each of their wells during the previous calendar year. Such reports shall summarize the monthly withdrawals for each well operated. If the water user submits an accurate and complete annual Utah Water Use Data Form it shall fulfill this requirement.

Owners of all groundwater wells that have the right to potentially withdraw 250 acre-feet or more annually, shall submit an annual water quality report for total inorganics. If an inorganic analyses is not performed every year, a copy of the inorganic analyses performed as per Department of Environmental Quality, Division of Drinking Water requirements, will satisfy this reporting requirement.

2.8 Monitoring Activities and Aquifer Status Update

The Division will monitor the water quality reports submitted by the water users and give an updated, valley-wide water quality summary every 5 years. The Division will also provide annual water use information such as valley-wide and regional withdrawals and priority lists.

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1.0 Introduction

The purpose of this document is to present the state engineer's proposed policy for the management of the ground-water resources of Salt Lake Valley. The objectives of this ground-water management plan are to promote wise use of the ground-water resource, to protect existing water rights, and to address water quality issues and over-appropriation of ground water in the valley. In proposing this ground-water management plan, the state engineer is using his statutory authority to administer the measurement, appropriation, and distribution of the ground water of Salt Lake Valley. This plan is intended to provide specific management guidelines under the broader statutory provisions within Title 73 of the Utah Code.

For the purposes of this plan, the Salt Lake Valley consists of the unconsolidated basin-fill material generally bounded by the Wasatch Range to the east, Oquirrh Range to the west, Great Salt Lake to the north, and Traverse Mountains to the south. This area is illustrated in Figure 1.

2.0 Proposed Salt Lake Valley Ground-Water Management Plan

The following policy guidelines are hereby proposed:

2.1 New Appropriations

The Salt Lake Valley is closed to new appropriations of ground water from the principal aquifer with the exception of single-family uses in non-subdivision areas where water is not available from a public water supply system. Applications to appropriate water will be limited to a maximum annual diversion of 1.0 acre-foot. The uses under such applications shall not exceed the in-house domestic purposes of one family, the irrigation of 0.10 acres, and/or the stock watering of a maximum of 10 heads of livestock. Such rights shall be approved as fixed time applications for a twenty-year period and upon the condition that when a public water system is available, the users will connect to the system, the well will be sealed, and the water right abandoned. Upon expiration of the twenty-year period, if a public water supply system is still not available, such application will be extended upon proper filing of a request for extension.

2.2 Ground-Water Withdrawal Limits

In order to fulfill the objectives of this management plan, guidelines are being proposed to help distribute ground-water withdrawals. If excessive withdrawals occur, the state engineer will distribute the water in accordance with the priority dates of the applicable water rights using the following guidelines:

2.2.1 Safe Yield from the Principal Aquifer

Salt Lake Valley has been divided into four regions: western, eastern, central, and

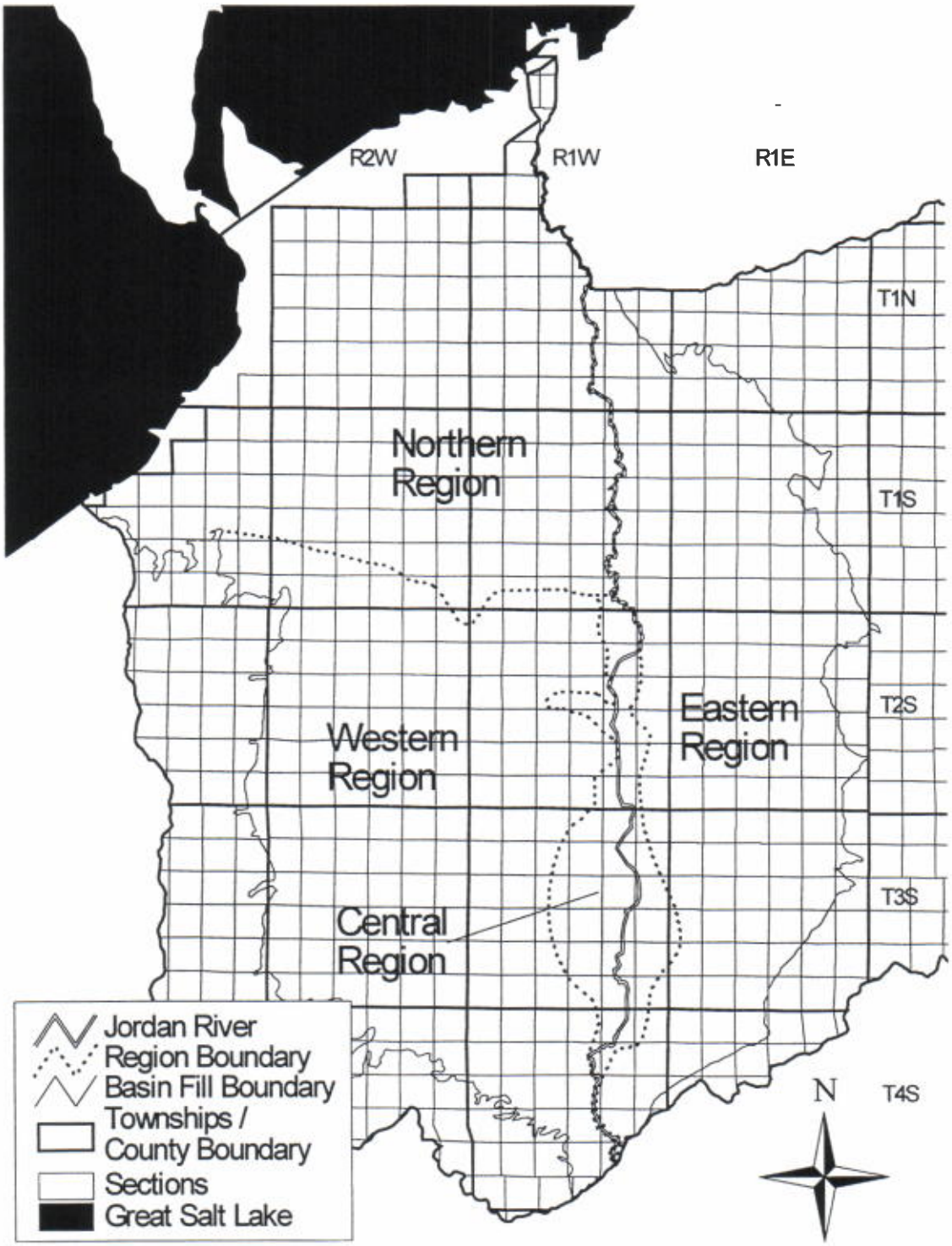

Figure 1. Salt Lake Valley Groundwater Management Plan Regions

northern as shown on Figure 1. The state engineer may limit the quantity of water withdrawn in these regions so that the average amount of water withdrawn over the long term does not exceed the safe yield. The safe yield of each region has been estimated and is shown in Table 1 below.

Table 1. Regional safe yields

Region	Safe Yield (acre-feet per year)
Western	25,000
Eastern	90,000
Central	20,000
Northern	30,000

2.2.2 Localized Ground-Water Withdrawals

The state engineer may limit withdrawals in any area of the valley where excessive withdrawals are causing definite and significant harm to the aquifer system. The state engineer recognizes that there are many different factors to consider in determining when and where this is occurring. Some of the relevant factors to consider are:

- ground-water level trends
- trends in ground-water withdrawal quantities
- changes in water quality
- recent climatic conditions
- local hydrogeologic conditions
- impact on existing water rights

Upon identifying areas where excessive withdrawals may be causing harm to the aquifer and after public review and commentary on applicable data, the state engineer may limit the withdrawals in that area according to the priority dates of each applicable water right and all applicable state statutes. The total quantity of ground water restricted from withdrawal will correspond to at least the quantity necessary to preclude further harm to the aquifer system. Further pumping restrictions may be imposed if harm to the aquifer system worsens. Pumping restrictions may also be lifted in part or in whole after the aquifer system has recovered to an acceptable level, provided no future reoccurrences of the conditions which caused the harm are anticipated.

2.2.3 Ground-Water Withdrawals From the Shallow Aquifer

Additional withdrawals above the allowable withdrawal limits set forth in this section will be allowed if such withdrawals are from the shallow aquifer, provided that such

withdrawals do not have an adverse effect on the aquifer or on other underground or surface-water rights.

2.2.4 Ground-Water Withdrawals From the Southwestern Portion of the Valley
A portion of the aquifer in the Southwestern part of the valley is being remediated by the removal of contamination associated with past mining practices. As part of the remediation effort, Kennecott Utah Copper Corporation (KUCC) has committed to assisting affected water users obtain adequate water. Applications in this area which propose to appropriate water, change the point of diversion, or drill a replacement well will be critically reviewed so as not to interfere with the remediation process. In conjunction with this, KUCC has committed to working with applicants to determine if there is a feasible well location, depth, and pumping rate for future wells in the contaminated area. The contaminated area is defined as extending 3000 feet from the known 250 mg/l sulfate isoconcentration contour. The approximate boundary for this area is shown on Figure 2.

2.3 Applications to Change the Point of Diversion, Place of Use, and/or Purpose of Use
Each change application will be evaluated based upon its own merits and in accordance with applicable statutes. In addition, the evaluation may consider – but will not necessarily be limited to – potential impact on existing water rights, the aquifer system as a whole, and overall water quality. The following guidelines will be used when evaluating change applications:

1) Change applications that propose to transfer water rights historically supplied from the shallow aquifer to the principal aquifer will not be approved.
2) Change applications that propose to transfer water rights into the eastern region from another region or into the western regions from another region will not be approved.
3) Change applications that propose to transfer water rights into a restricted area[1] will not be approved.
4) Change applications that propose to transfer water rights into a management square[2] where the potential withdrawals, under the existing water rights, exceed the limits set forth in Table 2 and shown in Figure 2 below will only be considered if the applicant can show that:
   a) There is sufficient reason to believe that existing water rights will not be impaired.
   b) Compensation or adequate replacement water will be provided to existing water rights if impairment occurs.
   c) Additional ground-water withdrawals will not significantly reduce water levels, degrade the water quality, or otherwise negatively impact the aquifer.

Table 2. Potential withdrawal limit guidelines for evaluation of change applications

Region	Maximum Potential Withdrawal per Management Square (acre-feet per year)
Western	4,000
Eastern	12,000
Central	6,000
Northern	6,000

5) Change applications that propose to transfer water rights from a restricted management square with a greater potential diversion to a restricted management square with a lesser potential diversion will be allowed provided that the potential diversion in the hereafter management square is at most 75% of the potential diversion of the heretofore management square and the criteria listed under numbers 1-4 above have been met.

6) Change applications that propose to drill a replacement well within a distance of one-half of one mile from the original point of diversion will be allowed provided that the criteria listed under numbers 1-4 above have been met.

2.4 Well Spacing and Flow Rate

Each new well shall be designed so that, when pumped at its maximum flow rate, it will not cause more than 12 feet of draw down on an existing well. Users in a particular area may enter into an agreement to provide a variance from this requirement if it does not interfere with third party rights and upon approval of the variance by the state engineer.

2.5 Extensions of Time for Water Right Applications

The state engineer will critically review all future extension requests on approved applications to appropriate or change water and applications for non-use pursuant to Section 73-3-12 of the Utah Code. In reviewing extension requests, if the state engineer finds unjustified delays or a lack of due diligence, he may reduce the priority date, grant the request in part, or deny the extension of time request.

2.6 Ground-Water Remediation Projects

The state engineer will evaluate each proposed ground-water remediation project based upon its own merits. In order to allow for remediation of ground water the state engineer may allow withdrawal amounts in excess of those withdrawal limits outlined in Table 1 above or allow changes that would exceed the limits set forth in Table 2 above if he finds that it is in the best interest of the public and has a specific project life.

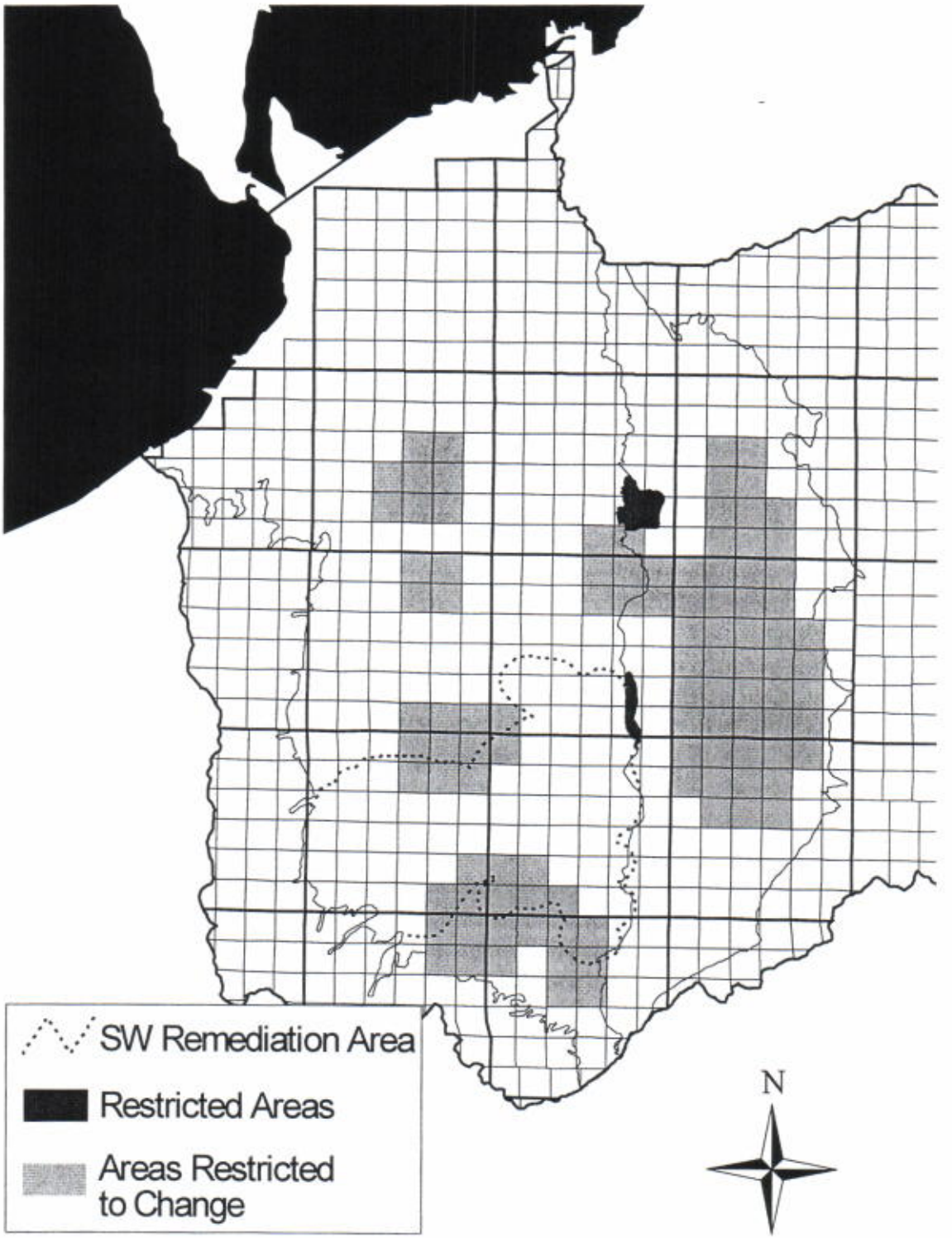

Figure 2. SW Remediation Area, Restricted Areas, and Areas Restricted to Change

2.7 Aquifer Storage Recovery (ASR)

The state engineer will evaluate each proposed ASR project based upon its own merits. In general, withdrawals credited from aquifer injection will not count towards the withdrawal limits outlined in Table 1 above.

2.8 Monitoring Activities and Aquifer Status Update

The Division will monitor water quality reports submitted by water users to the Division of Environmental Quality and periodically give an updated, valley-wide water quality summary. Additionally, the Division will provide water use information and will update the water rights priority lists periodically. Finally, the Division will review new pertinent data that further or more accurately defines the hydrogeology of Salt Lake Valley and will modify the plan if necessary. Any modifications to the plan would occur in consultation with water users and other interested parties.

Endnotes

1. *Restricted Areas*

There are two restricted areas currently in the plan that are associated with the following contaminated sites:

- Vitro Tailings Site
- Sharon Steel Site

as shown in Figure 1. In order to protect the quality of the water by preventing changes in the hydraulic gradient and mobilization of contaminants at these contaminated sites, the transfer of water rights into these areas will not be allowed. Restricted areas are based on available data and may change as new data is obtained. New restricted areas may be added to the plan upon request to the state engineer, an evaluation of the data supports such designation, and the public has had an opportunity to review the data and comment on the proposed designation.

2. *Management Squares*

A management grid has been set up based on the U.S. Public Land Survey's system. Under this system, the land is divided into township, range, and section. Each section is a square measuring approximately one mile on each side. In this management plan, one management square consists of any four sections, in a two section by two section configuration. Using this method, the squares overlap each other such that each section is actually part of four different management squares. Figure A, below, illustrates how section 11 is part of four different management squares.

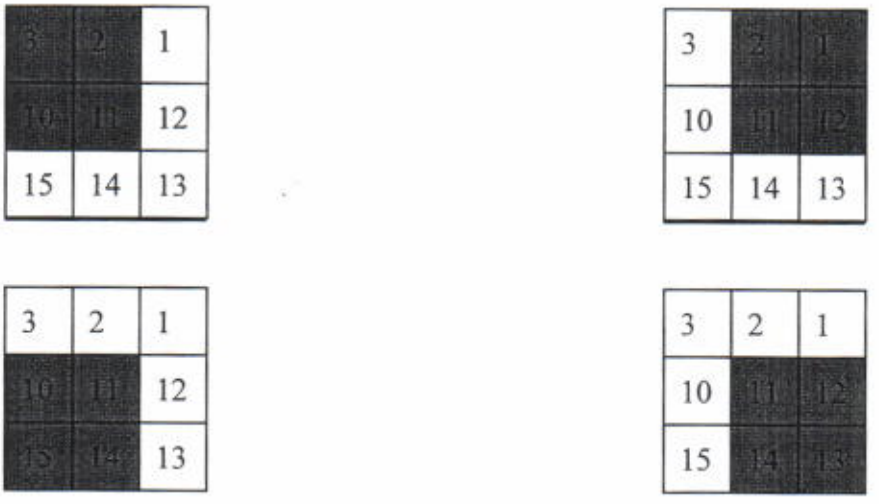

Figure A. Management squares for evaluating change applications.